BY ORDER OF THE
SECRETARY OF THE AIR FORCE

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Maintenance

IMPROVING AEROSPACE EQUIPMENT RELIABILITY AND MAINTAINABILITY

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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This instruction implements AFPD 21-1, *Managing Aerospace Equipment Maintenance*. It provides guidance and procedures for improving the reliability and maintainability (R&M) of fielded aerospace equipment through the use of Product Improvement Working Groups (PIWG). This instruction provides procedures for identifying R&M problems, assessing them, developing corrective actions, and implementing improvements. **Attachment 1** is a glossary of terms.

(AETC) AFI 21-118, 26 July 1994, is supplemented as follows:

This supplement applies to all Air Education and Training Command (AETC) aircraft maintenance, trainer maintenance, and support equipment maintenance activities. This supplement does not apply to Air Force Reserve Command or Air National Guard units. Maintain and dispose of records created as a result of processes prescribed in this publication in accordance with AFMAN 37-139, *Records Disposition Schedule* (will become AFMAN 33-322, Volume 4).

Recommendations for change, improvement, or waivers to this instruction should be annotated on AETC Form 1236, **Request for Improving/Changing AETC Maintenance Regulations/Instructions.** Requests must be approved by the appropriate group commander (or squadron commander, if not assigned to a group) before forwarding to HQ AETC/LGM, 555 E Street East, Randolph AFB TX 78150-4440, for action by HQ AETC/LGMMP.

SUMMARY OF REVISIONS

This revision reduces the former dependency on data analysis as the basis for improving aerospace equipment, replacing it instead with user input; eliminates the mandatory use of material improvement projects (MIP) and specifies the role users have in funding R&M improvements. It increases the role of the user

in the improvement process. This instruction changes references to HQ AFLC, HQ AFSC, and other organizations because of title changes resulting from restructuring. Also it realigns the allocation of responsibilities to various organizations and individuals because of functional changes resulting from that restructuring.

(AETC) This document is substantially revised and must be completely reviewed.

Chapter 1

RESPONSIBILITIES

1.1. HQ USAF/LGM:

1.1.1. Sets product improvement policy and provides guidance.

1.1.2. Identifies lead command executive agents to co-chair PIWG meetings with the single managers.

1.1.3. Advocates funding for R&M improvements.

1.2. HQ AFMC/XR:

1.2.1. Helps single managers get the necessary resources to implement this instruction.

1.2.2. Designates a point of contact (POC) for product improvement issues.

1.3. Single Managers (SM):

1.3.1. Develop procedures to address, track, and correct R&M problems identified by users of their aerospace equipment.

1.3.2. Include user identified R&M problems in their weapon system, product group, or materiel group master plan.

1.3.3. Plan and schedule PIWG meetings at least annually to:

- Receive feedback from the users of their equipment.
- Jointly establish priorities for future efforts.
- Provide updates concerning on-going efforts.
- Develop solutions to R&M problems.

EXCEPTION: The lead command, in coordination with all users, may waiver this requirement as necessary.

1.3.4. Provide information for product improvement submissions.

1.3.5. Plan, program, and budget for product improvement. This includes:

- Addressing product improvement in their master plan.
- Budgeting for engineering support.
- Budgeting for On-Site System Evaluations (OSSE).
- Funding technical order (TO) changes.

1.3.6. Verify implementation, through their customers, of approved product improvements.

1.3.7. Designate, by name and office symbol, their product improvement point of contact.

1.3.8. Assign equipment specialists or engineers to conduct OSSEs, as required.

1.4. Lead Commands:

1.4.1. Plan, program, and budget for product improvement. This includes:

- Establishing goals for aerospace equipment performance.
- Developing methods to assess deficiencies in performance.
- Identifying R&M deficiencies in the respective Mission Area Plans.
- Funding R&M improvements.

1.4.2. Designate a command functional manager for the aerospace equipment they use.

1.4.2. (AETC) The AETC functional management for T-1, T-6, T-37, T-38, and T-43 aircraft is HQ AETC/LGMAU, 555 E Street East, Randolph AFB TX 78150-4440.

1.4.3. Designate, in coordination with all users, a lead wing for each major subsystem of the aerospace equipment they use.

1.4.4. Publish a listing of lead wings and their assigned subsystems as a supplement to this instruction. Include office symbols and addresses in the listing.

1.4.4. (AETC) The 12 FTW is designated as the lead wing for T-1, T-6, T-37, T-38, and T-43 aircraft, to include all systems and subsystems. The point of contact for all product improvement working group (PIWG) issues on the above aircraft is 12 LG/MAQ, Hangar 3, 5th Street East, Randolph AFB TX 78150-4414.

1.4.5. Submit new PIWG agenda items, through the lead command executive agent, using the format in **Attachment 3**.

1.4.6. Brief new agenda items at the PIWG meeting. Include the necessary background and research to ensure other users and the single manager both fully understand the problem that the agenda item addresses.

1.4.7. Ensure that PIWG meetings have adequate and appropriate representation.

1.4.8. Help single managers get the data and information they need for product improvement analysis.

1.5. Lead Command Executive Agents:

1.5.1. Co-Chair the PIWG with the single manager.

1.5.2. Compile and forward proposed PIWG agenda topics from all users to the single manager.

1.5.3. Prepare requests for OSSEs, as required.

1.6. Lead Wings:

1.6.1. Designate a primary and alternate wing product improvement POC. The primary wing product improvement POC must be:

- A senior non-commissioned officer.
- An officer.
- Civilian equivalent.

EXCEPTION: The Logistics Group Commander may waiver this requirement in exceptional circumstances.

1.6.2. Focus their product improvement efforts on their assigned subsystem.

1.6.3. Identify, by component analysis, R&M deficiencies in their assigned subsystem.

1.6.4. Recommend technical solutions in their PIWG submissions.

1.6.5. Submit proposed PIWG agenda items for product deficiencies in their assigned subsystem.

1.6.6. Screen proposed PIWG agenda items from other users relating to the lead wing's assigned subsystem.

1.6.7. Provide appropriate documentation to support PIWG submissions.

1.6.8. Set aside adequate travel funds for attending PIWG meetings.

1.7. Air Force Operational Test and Evaluation Center:

1.7.1. Assigns a product improvement POC.

1.7.2. Attends PIWG meetings as appropriate.

1.7.3. Identifies R&M deficiencies and issues that it has found during operational test and evaluation (OT&E).

1.8. Joint Arrangements:

1.8.1. When the Air Force is the executive agency for aerospace equipment that it jointly develops with another government agency (US or foreign), the Air Force's single manager for that equipment must:

- Address those agency's product deficiencies.
- Use this instruction.

Chapter 2

PRODUCT IMPROVEMENT WORKING GROUPS (PIWG)

2.1. Objectives. The PIWG:

- Brings together those parties who oversee product performance and product maintenance.
- Ensures single managers understand the equipment users' knowledge and experience in the operational environment.
- Lets the customer and single manager work together to resolve aerospace equipment deficiencies.

2.2. Scope:

2.2.1. PIWGs address:

- Product deficiencies affecting R&M which the field units cannot resolve.
- Active Product Quality Deficiency Reports (PQDR) if the lead command executive agent and the single manager agree they are appropriate PIWG issues.

2.2.2. PIWGs don't address:

- Safety of flight issues under AFI 91-202, *US Air Force Mishap Prevention Program*.
- Supply support issues.

2.2.3. Single managers allocate sufficient time for PIWGs to adequately address all agenda items. Avoid combining PIWGs with other customer meetings, unless the customer agrees to the arrangements.

2.3. Single Manager Responsibilities. The single manager:

- Holds PIWG meetings at locations mutually agreed upon with the lead command executive agent.
- Co-chairs the PIWG with the lead command executive agent.
- Prepares and distributes the PIWG meeting minutes within 30 days of the meeting.
- Provides the PIWG membership progress reports according to **Attachment 2**.
- Invites necessary system support managers.

2.3.1. The PIWG may agree to accept meeting minutes in any format, such as:

- Paper copies.
- Electronic mail.
- Computer disk.

2.4. PIWG Participants:

2.4.1. These product/materiel groups must conduct PIWGs:

- Generator Material Group.
- Ground Support Equipment Material Group.
- Power Systems Material Group.

- Automatic Test Systems Product Group.
- Air Force Metrology and Calibration Material Group.
- Munitions Product Group.

2.4.1.1. Other product and materiel groups may hold PIWGs when the user asks.

2.4.2. The PIWG's minimum membership composition is:

- The single manager or their designated representative.
- The system support manager(s) or their designated representative.
- The Lead Command Executive Agent or their designated representative.
- A representative from each of the using commands.

2.5. Setting Up PIWGs:

2.5.1. The lead command executive agent and single manager agree upon a date and location for the PIWG.

2.5.2. Command functional managers send proposed agenda items to the lead command executive agent, who compiles them and then forwards them to the single manager.

2.5.3. Lead command executive agent(s) must submit all users' new agenda items to the single manager at least 45 days before the PIWG.

EXCEPTIONS:

1. Submit Priority 1 items at any time before the meeting.
2. Single managers may approve other items that lead command executive agent(s) submit inside the 45-day window.

2.5.3. (AETC) The lead wing will submit inputs to HQ AETC/LGMAU at least 60 days before the PIWG.

2.5.4. Single managers who disagree with proposed agenda items return them to the lead command executive agent with a justification.

2.5.5. If the lead command executive agent disagrees with the justification the item becomes part of the agenda.

2.5.5.1. Single managers include a formerly disputed but subsequently resolved item on the agenda with the other agenda items if the lead command executive agent originally submitted the item 45 days before the PIWG.

2.5.6. Single managers screen proposed agenda items their personnel generate

2.5.7. Single managers use the proposed agenda items and their own inputs to build an agenda which they transmit to the PIWG participants 30 days prior to the meeting.

2.6. Conducting the PIWG:

2.6.1. PIWG participants discuss old and new business. The single manager updates participants on old agenda items. The individual submitting new agenda items briefs their item.

2.6.2. When possible, the party submitting the item should bring defective components to the PIWG as visual aids. If this is not possible then include photographs or videotapes of the affected product in the presentation.

2.6.2. (AETC) When possible, submissions should be accompanied by a defective component and a well-produced video presentation that details the old procedure and the new procedure. A video will allow the best opportunity to clearly explain the new idea.

2.6.3. The chairpersons jointly assign action items for agenda items requiring investigation.

2.6.4. The participants identify criteria to help prioritize product improvement efforts.

Chapter 3

ON SITE SYSTEM EVALUATION (OSSE)

3.1. Background. An OSSE helps equipment specialists and engineers get a clear understanding of Priority 1 deficiencies. To do this, an appropriate equipment specialist or engineer:

- Visits the lead wing to investigate a deficiency.
- Discusses possible solutions with the lead wing.
- Shares the problem with the single manager.

3.2. Procedures:

3.2.1. Lead command executive agents through the command functional manager, if applicable, may contact the single manager to dispatch an OSSE after receiving notification from a lead wing of a Priority 1 deficiency.

3.2.2. Lead wings may request an OSSE through their command functional manager by any means available, such as:

- Telephone.
- Letter.
- Electronic message or E-mail.

3.2.3. The lead wing requesting an OSSE must formally submit the item for the next PIWG agenda in accordance with **Attachment 3**.

3.2.4. The single manager and the lead command executive agent may agree to conduct an OSSE for Priority 2-4 deficiencies that are important to a deficiency investigation.

3.2.5. The equipment specialist conducting the OSSE submits to the single manager a trip report providing the results of their evaluation.

3.2.6. The single manager briefs participants on the results of an OSSE at the PIWG.

3.2.7. Single managers:

- Budget for the travel expenses of necessary engineers and/or equipment specialists.
- Provide travel funding to accomplish OSSEs.

Chapter 4

CORRECTING DEFICIENCIES

4.1. Identifying the Deficiency. Once single managers accept an action item from the PIWG, they identify the causes and scope of the problem. During this process, the single manager's technical personnel assess the problem. This assessment includes finding out:

- If the problem is occurring at more than one location.
- How often it occurs.
- If the problem impacts other systems, subsystems, or components.

4.2. Analyzing the Deficiency. Single managers next conduct an analysis to ensure their personnel have:

- Reviewed all aspects of the problem.
- Identified alternatives.
- Selected the appropriate corrective action.

4.2.1. During analysis and before selecting a corrective action, single managers must consider:

- Technical data changes.
- Budgetary concerns.
- New technologies.
- Deployment Requirements.
- Aerospace equipment availability.
- Readiness.
- Product Warranty Considerations

4.3. Generating Corrective Action. After assessment and analysis of the deficiency, single managers must:

- Develop a proposed corrective action.
- Submit the solution to the customers for approval.
- Validate the corrective action (once approved) by testing, if requested by the user, to ensure that it will solve the problem.

4.3.1. Single managers must:

- Coordinate all validation testing with the operational users.
- Give the users the opportunity to be present during validation.
- Make every effort to validate at a mutually agreed-upon field organization location.

4.4. Implementing Corrective Action. Single managers process selected solutions to product improvements resulting in modifications according to AF Supplement 1 to DoD Instruction 5000.2, *Defense Acquisition Management Policies and Procedures*, February 23, 1991, with Change 1.

4.4.1. Single managers must include planned improvements resulting from PIWG actions in their master plan.

JOHN M. NOWAK, Lt General, USAF
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Attachment 1

GLOSSARY OF TERMS

Terms

Aerospace Equipment—Equipment that the Air Force uses and maintains to meet its mission. It includes:

- Aircraft, missiles, and space equipment.
- Communication-Electronic (C-E) equipment.
- Avionics and engines.
- Training, support, and aerospace ground equipment.
- Sound suppressers.
- Test measurement and diagnostic equipment.
- Major end-items of all equipment.
- Simulation tools/hardware.
- *Conventional munitions/missiles.*

Air Staff Functional Manager—The individual in Headquarters Air Force/DCS Logistics who oversees the maintenance support of a particular type of aerospace equipment.

Availability—The percentage of time aerospace equipment is ready to perform some part of the intended work for its operational user. Usually expressed as a Mission Capable rate.

Command Functional Manager—The individual designated by their operational commands' headquarters who oversees the maintenance support of a particular type of aerospace equipment.

Designated Acquisition Commander (DAC)—The individual who functions as the PEO on programs that are not assigned to a PEO. The commanders of product centers and logistics centers act in this capacity. DACs, like PEOs, are accountable to the Air Force Acquisition Executive for execution of their assigned acquisition programs.

Lead Command—The command identified as the primary weapon system advocate in AFPD 10-9, *Lead Operating Command Weapon System Management*. The Air Staff functional manager assigns a lead command for aerospace equipment not listed in AFPD 10-9.

Lead Command Executive Agent—The lead command maintenance functional manager for a particular type of aerospace equipment who:

- Co-chairs the PIWG.
- Represents other users on product improvement issues.

Lead Wing—A field level unit designated by the lead command to serve as the technical expert for a major subsystem.

Materiel Group—Several items that AFMC manages together for sustainment largely for reasons of economy of scale and specialization of technical/engineering expertise. A materiel group does not fall within a weapon system, military system, or product group and does not require a standing development capability.

Materiel Group Manager (MGM)—The single manager for an AFMC Materiel Group who :

- Manages all cost, schedule, and performance aspects of a materiel group and related sustainment.
- Coordinates directly with the customer on these issues.
- Reports to a Designated Acquisition Commander.

Product—A term including items, material, equipment, data, software, supplies, systems, assemblies, subassemblies that the Air Force produces, purchases, develops, or otherwise uses.

Product Deficiency—A defect or condition in a product that prevents or limits the product's availability and/or impairs the customer's ability to maintain it. Product deficiencies exist in:

- Design.
- Specification.
- Material.
- Manufacturing.

Product Group—A compilation of several specific items (in all life cycle phases) that form part of ongoing development requirements and much larger cumulative sustainment efforts.

Product Group Manager (PGM)—The individual in an AFMC Product Group who:

- Manages all cost, schedule, and performance aspects and related sustainment activities.
- Coordinates directly with the customer on these issues.
- Reports to a Designated Acquisition Commander (DAC).

Product Improvement—A conscientiously applied process of identification, analysis, and corrective action of product deficiencies. In this process the user identifies deficiencies in aerospace equipment and informs the responsible single manager. The single manager analyzes and corrects these discrepancies by either:

- Improving procedures.
- Modifying or replacing equipment.

Product Improvement Working Group (PIWG)—A number of individuals, representing aerospace equipment users and single managers, assembled together for the purpose of product improvement.

Program Executive Officer (PEO)—The corporate operating official who supervises a portfolio of mission related acquisition category I and selected programs. The PEO is accountable to the Air Force Acquisition Executive.

Single Manager—The generic title for a designated:

- AFMC System Program Director.
- Product Group Manager.
- Material Group Manager.

System Support Manager (SSM)—The individual who provides sustainment and logistics planning for a system over its lifetime and teams with a:

- Subsystem manager
- Segment manager

- Material Group Manager
- Product Group Manager

System Program Director (SPD)—The individual in an AFMC System Program Office (SPO) who is ultimately responsible and accountable for a program's execution and:

- Coordinates directly with the user.
- Reports to a Program Executive Officer (PEO) or Designated Acquisition Commander (DAC).

Attachment 2

PRIORITIZING PIWG AGENDA ITEMS

A2.1. Product Improvement Priority Definition, and Reporting Requirements. Four product improvement priorities exist. The priority that lead commands assign to a product improvement drives funding and single manager resource allocation. Product improvement priorities also guide single managers in reporting the progress of corrective action to the user. The user and the single manager correcting a deficiency must agree upon the priority. In the event of disagreement, assign the users' priority.

A2.2. Priority 1. Deficiencies which prevent aerospace equipment from performing its designed mission or function. This includes deficiencies in:

- Aerospace equipment subsystems.
- Mission equipment.

A2.2.1. Reporting. The single manager sets aside the necessary resources to correct these deficiencies in the shortest possible period. They update the using commands quarterly until corrective action is complete. Single Managers may not use PIWG meeting minutes to satisfy this requirement.

A2.3. Priority 2. Deficiencies which impair or limit aerospace equipment from performing its designed mission or function with the potential to become a Priority 1 deficiency.

A2.3.1. Reporting. The single manager correcting the deficiency provides progress reports to the using commands on Priority 2 items semiannually. Single Managers may not use PIWG meeting minutes to satisfy this requirement.

A2.4. Priority 3. Deficiencies which impair or limit aerospace equipment from performing its designed mission or function but do not have the potential to become Priority 1.

A2.4.1. Reporting. The single manager correcting the deficiency provides progress reports to the using commands on priority 3 items annually.

A2.5. Priority 4. Deficiencies which impair or limit the users' ability to repair the equipment.

A2.5.1. Reporting. The single manager correcting the deficiency provides progress reports to the using commands on priority 4 items annually.

Attachment 3

SUBMITTING PIWG AGENDA ITEMS

A3.1. Any agency using the product may submit an item for consideration by the PIWG.

A3.2. The party submitting the item forwards their submission, using the format in this attachment, to the assigned lead wing. The lead wing screens the submission and accepts or rejects it. If accepted, they forward the submission to their command functional manager.

A3.3. The lead wing recommends a priority with the understanding that it may change based on agreements that PIWG participants make.

A3.4. The lead wing submits new PIWG agenda items through their command functional manager at least 60 days before the PIWG meeting using the format in this attachment or by message including the same information.

A3.5. Command functional managers screen all new agenda items that the lead wings submit to ensure that they are appropriate for the PIWG.

A3.6. Neither the lead command executive agent nor the single manager may reject product improvement submissions that are incomplete. Instead, they must make every effort to clarify the submission before adding it to the PIWG agenda.

A3.7. Users identify items requiring PIWG action using this format:

- Title or subject.
- Suggested priority.
- MDS.
- Work Unit Code (WUC).
- NSN.
- Part number.
- Technical order number (Page, section, figure, and index).
- Submitter:
  - Name and rank or grade.
  - Office symbol.
  - Mailing address.
  - DSN or COML.
  - MAJCOM.
- Background and discussion.
- Suggested action.

NOTE: The reporting requirements in this attachment are exempt from licensing in accordance with AFI 37-124, *The Information Collections and Reports Management Program; Controlling Internal, Public, and Interagency Air Force Information Collections.*